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The impact of family separation and worry about family upon psychological adjustment in refugees resettled in Australia

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Abstract

Few reliable predictors of post-arrival psychological adjustment have been identified for refugees once they arrive in their host country. We investigated the relationship between family separation and psychological symptoms in refugees resettled in Australia from 2013-2016. Participants were 1495 adult refugees (*M* = 38.9yrs, *SD* = 12.7) who participated in the Building a New Life in Australia (BNLA) population-based study across a four-year period. Participants were assessed for psychological distress (using the Kessler-6 [K6]) and Posttraumatic Stress (PTS) symptoms (using the Posttraumatic Stress Disorder – 8 [PTSD-8]). Latent class growth analysis (LCGA) was used to identify latent longitudinal trajectories and binary logistic regression was used to assess the contribution of family predictor variables towards PTSD-8 and K6 trajectory class membership. LCGA supported a 4-trajectory class solution for Posttraumatic Stress symptoms: "Improving Posttraumatic Stress (PTS) symptoms" (18.4%), "Persistent High PTS" (11.5%), "Resilient PTS" (57.3%), and "Deteriorating PTS" (12.6%). For K6, LCGA supported a 4-class solution: "Persistent High K6" (7.0%), "Improving K6" (17.3%), "Resilient K6" (61.1%) and "Deteriorating K6" (14.6%). Separation from family members did not independently predict the course of psychological symptoms. In contrast, worry about family and friends contributed to the persistence of high PTSD-8 and deteriorating K6 scores. The current findings suggest that, rather than separation alone, unfavourable trajectories of psychological symptoms during the post-settlement phase may instead be defined by worry about family and friends in addition to older age and female gender.

Keywords: Refugees; resettlement; Posttraumatic Stress; trauma; family; separation; worry; psychological distress.

In the most recent United Nations High Commissioner for Refugees Report it was found that the number of refugees reached has reached 25.9 million people worldwide (UNHCR, 2018). Refugees are often exposed to war, political instability, violence, and displacement in their country of origin (Fazel, Wheeler, & Denesh, 2005), rendering them a highly vulnerable population. This vulnerability is reflected in high rates of estimated psychological disorders in refugees during the post-settlement period, namely post-traumatic stress disorder (PTSD; between 8 and 37% in Slewa-Younan, Guajardo, Heriseanu, & Hasan, 2015), depression (between 28 and 75% in Slewa-Younan et al), anxiety (21% in Alexander, David & Grills, 2013), and prolonged grief disorder (9% in Steil et al., 2019), the large between-study variability in estimates notwithstanding.

Understanding the factors which predict optimal post-settlement psychological adjustment is important for ensuring that refugees have the opportunity for fulfilling and productive lives. To date, the primary post-settlement factor that has consistently been found to predict psychological adjustment following arrival in a host country has been security of residency. For instance, a prospective study of asylum seekers found that those who received a positive outcome reported substantial improvements in PTSD, depression and anxiety symptoms compared to those who remained in uncertainty, after controlling for premigration trauma (Silove et al., 2007), consistent with a slew of similar studies (e.g., Jakobsen, Meyer DeMott, Wentzel-Larsen, & Heir, 2017; Momartin et al., 2006). Thus, persistence of Posttraumatic Stress (PTS) symptoms and psychological distress may be a reflection of these factors.

Alongside these recognised factors, there is an emerging recognition that family separation may also play a key part in post-arrival PTSD and psychological distress (Miller, Hess, Bybee, & Goodkind, 2018; Schweitzer et al., 2006; Simich, Este, & Hamilton, 2010; see Li, Liddell & Nickerson, 2016 for a review). Families are frequently separated in the

process of migration as a consequence of forced displacement (Jenkinson, Silbert, De Maio, & Edwards, 2016) or from migration policies of the host country (Wilmsen, 2013). Rousseau, Mekki-Berrada, and Moreau (2001) documented the nature of separation in refugees, and found that approximately 20% of families migrated with all members present, and were separated for 3.5 years on average. Broadly, research indicates that the aversive effects of pre-migration trauma are reinforced when family members are separated, creating a compounding stress effect (Rousseau et al., 2001; Beiser & Hou, 2001). Likewise, the consequences of separation may be exacerbated by the absence of family members who otherwise serve as a protective factor in the post-settlement country (Rousseau et al., 2001; Wilmsen, 2013). Specifically, there is research to suggest that the presence of a family member in the post-migration country can reduce levels of depression (Birman & Tran, 2008), and mitigate the psychological impacts of migration stress (Rousseau et al., 2001; Wilmsen, 2011).

Of critical importance in determining the impact of family separation is the nature and reasons for the persistence of family separation. In some cases, separation may be a considered decision on the part of the refugee and their family, and may not have a harmful influence on mental health. On the other hand, if separation is involuntary and associated with worry for the welfare of family members, then the psychological consequences are presumably more significant. This relationship between involuntary separation and psychopathology is reflected in the literature, which suggests that worry about family may be a critical contributor to symptoms of psychological distress and PTSD. Schweitzer et al. (2006) explored post-migration factors, pre-migration trauma, and social support on psychological outcomes, and found that worry about family separated in migration alongside communication difficulties were of greatest concern for Sudanese refugees resettled in

Australia. Notably, post-migration experiences of worry about family contributed to depression, anxiety, and PTSD in as much as the effects of pre-migration trauma.

Nickerson et al. (2010) explored psychopathology in the context of ongoing family separation, and found that intrusive fears for immediate family members remaining in Iraq predicted increased levels of PTSD and depression after accounting for pre-migration trauma. Similarly, Simich et al. (2010) explored family and social factors on Sudanese refugees' mental health in a community based study. The results indicated that worry about family in the country of origin was the greatest stressor for refugees in the first year of resettlement, a finding also mirrored by Steel et al. (2006). Finally, qualitative reports of family separation have documented the relationship between prior and ongoing experiences of trauma and worry about family (Rousseau et al., 2001; Wilmsen, 2013). The literature suggests that it may be worry about family, rather than separation per se, that drives unfavourable psychological consequences for an individual. Worry about family may serve to maintain a current sense of threat, and in turn, PTSD symptoms or symptoms of psychological distress.

The current study aimed to explore the relative contribution of family separation and worry about family on psychopathology in refugees. Despite the emerging evidence to suggest a relationship between family separation and psychological adjustment, studies in this area have been predominantly cross-sectional (Rousseau et al., 2001; Schweitzer et al., 2006; Simich et al., 2010; & Wilmsen 2013) or retrospective (Birman & Tran, 2008; Nickerson et al., 2010) with an absence of prospective research which specifically addresses the long-term relationship between family separation and psychological symptoms in refugees. To address this question, we report data from the first 3-years of the Building a New Life in Australia (BNLA) study, a large, representative cohort study of recently arrived refugees in Australia.

The aforementioned literature suggests that the psychological functioning of refugees is compromised by family separation (e.g. Schweitzer et al., 2006; Wilmsen, 2013), and protected by the presence of family. This lead to the following hypotheses:

1. Individuals who are separated from family will have a less favourable trajectory of psychological distress and PTS across time.
2. Individuals who have a family member arrive from the country of origin during the follow up period will have a more favourable trajectory of psychological adjustment compared with those who do not, on the basis that a reduction of family members at potential risk in the country of origin would be associated with more favourable levels of psychological symptoms.
3. In line with emerging research suggesting that worry about separated family members may be associated with greater PTS and depression symptoms, we also hypothesised that worry about family would be associated with unfavourable trajectories of PTS and psychological distress symptoms respectively.

Method

The BNLA study is a population based, longitudinal study conducted on refugees granted humanitarian visas in Australia. The initial wave of data collection began in October 2013 and data was collected annually between October and February from 2013-2017. This report is derived from the first four waves of data. Data collection alternated between face-to-face interviews (administered by an interviewer or by self-interview on a computer) and telephone interviews. Participants were required to answer questions on a range of domains, including demographic information, housing, language, proficiency, education, employment and income, pre-migration experiences, health, self-sufficiency, community support, life satisfaction, and life in Australia. Interview questions were translated into multiple languages or completed with an interviewer who was matched to the participants' native language.

Ethics approval was obtained through the (blinded for peer review) Human Research Ethics Committee and the Institutional Review Board (Blinded for review).

Participants and Procedure

The study participants were 2399 humanitarian migrants from the BNLA study, aged 15-83 years and granted permanent humanitarian visas in Australia. Humanitarian visas were granted to individuals and migrating units (MU's) 3-6 months prior to completing the survey. Migrating units consisted of principal applicants (lead applicant for the MU) and secondary applicants (other members of the MU aged 15 years and over) named on the same visa application. The participants were from 35 different countries and varying cultural backgrounds. Participants were recruited from 11 different sites around Australia, including regional areas and major cities. Of the 2399 participants, 1509 participants were principal applicants and 890 were secondary applicants. Analyses only focused on principal applicants to avoid the risk of analysing multiple members of the same family.

Measures

The Post Traumatic Stress Disorder Scale - 8 items (PTSD-8; Hansen, et al., 2010) was used to assess PTS (intrusion, avoidance, hypervigilance). The PTSD-8 was derived from the Harvard Trauma Questionnaire (HTQ), and has demonstrated strong psychometrics (Hansen, et al., 2010). Symptoms were assessed over the past week on a 4-point Likert scale (Hansen, et al., 2010). In the current study, the PTSD-8 demonstrated adequate internal consistency (Cronbach's α) ranging from .92 to .94 across the four waves.

The Kessler Psychological Distress Scale - 6 item (K6; Kessler, et al., 2003) was used to assess psychological distress over the past month (e.g. nervousness, hopelessness, restlessness, worthlessness; Mewton, et al., 2016). The Australian version of the K6 consists of six questions scored on a 5-point scale, and total scores are obtained by summing the individual item scores. The K6 has been translated into multiple languages and used cross-

culturally for measuring nonspecific psychological distress (Kessler, et al., 2010). In the current study, the K6 demonstrated good internal consistency (Cronbach's α) ranging from .87 to .90 across all four waves.

A range of other demographic, occupational and migration-related items were administered at each wave of assessment. However, for the present research, we focused on six key variables: 1. participant gender, 2. participant age, 3. whether the participant was living with close family members at Wave 1 (i.e., partner, child, parent or sibling from the same migrating unit; yes/no), 4. Whether family were waiting in the country of origin (yes/no), 5. Worry about family or friends overseas (yes/no), 6. Whether additional family members had arrived since migration by Wave 1 (yes/no). We focused on Wave 1 variables for our analyses as we wanted to know the prospective value of each respective variable for the subsequent course of PTS and K6 symptoms and because not all variables were assessed at each wave.

Data Analysis

The study is a within-groups design with participants completing the questionnaires at each of the four time points. A population sampling weighting was not applied as we were interested in the relationships within and between participants within the sample rather than estimates about the overall population. Descriptive statistics including the mean, standard deviation, and frequencies were used to summarise the demographic information of the study participants at Wave 1 and are displayed in Table 1. The PTSD-8 and K6 were modelled as numerical interval measures.

The number of principal applicants with complete data for the PTSD-8 were 1443 (96.5%), 1246 (83.3%), 1124 (75.2%) and 1154 (77.2%) at waves 1 to 4 respectively; and for the K6, 1457 (97.5%), 1264 (84.5%), 1140 (76.3%) and 1168 (78.1%) for waves 1 to 4

respectively. Little's MCAR test indicated that values for the K6 and PTSD-8 were missing at random across the four waves ($\chi^2 = 244.45$, $df = 215$, $p = 0.08$).

Latent growth modelling analysis

We used a latent growth modelling approach to determine whether latent classes could be identified for groups of participants with similar trajectories of K6 and PTSD-8 symptoms across each annual wave of assessment. This approach divides the trajectories of groups of participants into mutually exclusive and exhaustive classes (Collins & Lanza, 2010), which are "latent" in that class membership is not directly observed or measured (O'Donnell, et al., 2017). We thus ran Latent Growth Mixture Models (LGMM) for K6 and PTSD-8 symptoms respectively. The resulting models did not converge when a full LGMM was applied for each of the PTSD-8 and K6. These problems with the LGMM persisted when we used a Bayes estimator (which more often achieves convergence than maximum likelihood approaches; Asparouhov & Muthen, 2010) and also when the number of iterations and random starts were varied.

Hence we proceeded to specify latent class growth analysis (LCGA) models which are a specific case of LGMM whereby the within class variance for both intercept and slope values are set to zero (Frankfurt, Frazier, Syed, & Jung, 2016). To build the LCGA models we commenced with an intercept-only model, before extending the analyses to include slope as well as increasing numbers of classes which was able to achieve convergence for PTSD and K6 models. Covariance coverage for pairs of variables were all above the minimum .10 for model convergence (PTSD-8, .66-.97; K6, .68-.98) (Muthén & Muthén, 1998-2012).

The number of classes was determined partly on the basis of theory (parsimony being favoured), and partly on the basis of a number of fit indices. The Akaike Information Criterion (AIC, Akaike, 1974) and Bayesian Information Criterion (BIC, Schwarz, 1978), Sample size-adjusted BIC (Sclove, 1987) and Consistent Akaike Information Criterion

(Bozdogan, 1987) goodness of fit indices were considered, where lower values correspond to improved model fit. We also report the results of two likelihood ratio tests: the Bootstrap Likelihood Ratio Test (BLRT; McLachlin & Peel, 2000) and the Vuong-Lo-Mendell Likelihood Ratio Test (Lo, Mendell & Rubin, 2001), which provide a p-value which indicates if a model fits the data better than a model with one less class (Nylund, Asparouhov, & Muthén, 2007). The entropy values, which indicate the classification accuracy of a solution, are also reported with values closer to 1 indicating relatively stronger class classification accuracy (Geiser, 2010). Finally, in line with the approach of other researchers (e.g., Andruff et al., 2009; Infurna & Grimm, 2018), classes comprising less than 5% of the overall sample were considered less favourable on the basis that such solutions can be unstable. Analyses were conducted in Mplus version 7.31 (Muthén & Muthén, 1998-2012). All models included an intercept and slope term, and the number of random starts was set to 1000, and with 200 optimisations for the final stage of analysis. Mplus uses a Full Information Maximum Likelihood (FIML) approach to handling missing data as default (Muthén & Muthén, 1998-2012). Consistent with the LCGA approach, all within class variances were set to zero (Jung & Wickrama, 2008).

The binary comparisons reported as part of the multinomial regression analyses were used to estimate the odds of falling within a particular PTS or K6 trajectory class membership. Predictor variables were added simultaneously into the regression model. In each case, the "reference" category corresponded to an absence of the respective variable (e.g., "0" corresponded to an absence of family members who had arrived). Predictors included the demographic characteristics of age and gender, and post-migration family variables at Wave 1. Gender was included on the basis that previous research suggests that gender is predictive of PTSD symptoms in a sample of refugees from Iraq (Nickerson et al., 2010) – such that there may be gender differences in PTSD trajectories. Gender differences in

psychological distress reported by refugees has also been reported (Chung et al., 1998). Age was included on the basis that the risk of lifetime trauma exposure (and by extension, PTSD symptoms) increases with age and given that psychological distress levels also vary across the age span. (Jorm et al., 2005). Post-migration predictor variables included family waiting to migrate (including extended family members), living with family, worry about family and friends, and arrival of family members since migration (see Table 3 and 5). We used wave 1 variables noting that assessment of some of these variables changed across subsequent waves of the study.

Next Multinomial logistic regression analyses were conducted using IBM SPSS Statistics version 26, after the most likely class membership for each participant was extracted from Mplus. For our primary analyses, close family members were considered to be partners, parents, children or siblings of the participant. We also repeated the regression analyses when considering separation of extended family members (i.e., grandparents, aunts/uncles, cousins and other). Principal applicants who were missing all four waves of data from either the PTSD-8 or K6 scale were excluded from the data analysis. These participants were excluded on the basis that Mplus analyses cannot be conducted on participants who are missing data on the dependent variable at all time points, but can run analyses on those participants missing data at one or two time points. Of the 1509 principal applicants, 1495 were then included for data analysis in Mplus. For consistency across analyses, all further data analysis was conducted on the 1,495 participants.

Results

Participant Profile

The social and demographic characteristics of the participants are summarised in Table 1. The sample used for analysis consisted of 1495 participants of whom 1052 were male 70.4%), consistent with the gender mix of principal visa applicants.

The mean age was 36.86 years (*SD* = 12.66, *Mdn* = 34, range 18-75yrs). Prior to migration, 91.5% of participants reported exposure to trauma. The majority of participants (72.7%) had arrived in Australia less than 5 months prior to the first interview. Family separation from a spouse or partner was reported by 12.4% of responders and separation from children 17.1%. The proportion of the sample at Waves 2, 3 and 4 who reported that a family member had arrived from overseas since the preceding timepoint were 11.4%, 12.5%, and 19.3% respectively.

Worry about family and friends overseas (52.2%) was the second most frequent reported post-migration stressor following language barriers (57.7%). Scores for the PTSD-8 and K6 questionnaires were relatively stable across each wave of the study, ranging between 14.61 and 16.37 for the PTSD-8, and between 11.82 and 12.90 for the K6 (see Table S1 of the supplementary material for Means and SDs).

There was relatively small variation in the length of interval between each of the assessment points across the sample (Mean number of months from Wave 1 to Wave 2 = 10.9, *SD* = 1.7; from Wave 2 to Wave 3 = 12.27, *SD* = 1.5; and from Wave 3 to Wave 4 = 12.10, *SD* = 1.2). Analyses used assessment points (1, 2, 3, and 4) rather than the number of months between assessments as the time-related variable as assessment date was recorded to the nearest month, precluding precise time-interval estimates between assessments.

Preliminary analyses investigated whether the course of PTS and psychological distress symptoms for the overall sample were best described by linear or quadratic trajectories. The quadratic model for each of PTSD-8 and K6 symptoms converged when applying a Bayes estimator, with (lower) BIC values for PTSD and K6 indicating that a linear trajectory best described the data in each case: the BIC values for PTSD-8 were 32320.76 (linear) and 32340.65 (quadratic) respectively; and the BIC values for K6 were 31221.29 (linear) and 31222.84 (quadratic) respectively.

Posttraumatic Stress symptoms (PTS) LCGA model

Table 2 reports the absolute model fit, classification accuracy, and relative model fit statistics for PTSD-8 trajectory class memberships. Classes were progressively entered from a 1-class solution to a 7-class solution. The values of absolute fit indices continued to decrease with consecutive classes however, this is not unusual for latent class analyses (Nylund-Gibson & Choi, 2018). Likewise, the BLRT remained significant for each class solution. The 6 and 7 class solutions each included classes which comprised less than 5% of the overall sample and the five class solution did not appear to add explanatory value beyond the 4-class solution in that, for the five class solution, two of the classes from the 4-class solution appeared to split into separate but parallel decreasing trajectories. Since the VLMRLRT value was not significant for five or more classes, and given that previous post-trauma trajectory studies have tended to identify four similar trajectory classes (e.g., Bonanno et al., 2012), we selected the 4-class solution for PTSD-8 class membership as the best fit to the data (VLMRLRT $p < .05$). While the initial four class solution indicated local maxima, we were able to replicate the loglikelihood twice with larger random starting values (using 80 and 16, and 160 and 32 sets of first step optimisations and largest log likelihood values respectively). We describe the classes of participants as: Class 1 “Improving PTS” ($n = 275$, 18.4%), Class 2 “Persistent High PTS” ($n = 172$, 11.5%), Class 3 “Resilient PTS” ($n = 860$, 57.3%), Class 4 “Deteriorating PTS” ($n = 188$, 12.6%). Figure 1 provides a visual representation of the four classes of PTSD-8 symptom trajectories.

Psychological Distress LCGA model

Table 3 summarises the absolute model fit, classification accuracy, and relative model fit statistics for K6 trajectory class memberships. Fit indices continued to decrease in value across successive classes and the BLRT remained significant for each successive class solution, up to and including 7 classes. Nonetheless, when graphed, there appeared to be a

distinct change in gradient of the decreasing BIC values at the four-class solution (Nylund-Gibson & Choi, 2018), each solution beyond 4 classes included at least one class with <5% of the overall sample, and the VLMRLRT value was not significant for five or more classes, suggesting that a 4-class solution for K6 class membership was best supported by the data ($p < .0001$).

Latent class growth analysis revealed four classes of participants: Class 1 "Persistent High K6" ($n = 104$, 7.0%), Class 2 "Improving K6" ($n = 259$, 17.3%), Class 3 "Resilient K6" ($n = 914$, 61.1%) and Class 4 "Deteriorating K6" ($n = 218$, 14.6%). While the initial four class solution indicated local maxima, we were able to replicate the loglikelihood twice with larger random starting values (using 80 and 16, and 160 and 32 sets of first step optimisations and largest log likelihood values respectively). A visual representation of the four K6 symptom class trajectories are shown in Figure 2.

Multinomial regression results: predictors of trajectory class membership

Multinomial logistic regression analyses were used to assess the contributions of demographic factors and post-migration stressors on PTSD-8 and K6 class memberships respectively. Given the possibility of multicollinearity between some of the variables in the analysis, variance inflation factor values were reviewed in SPSS. No variance inflation factor value was greater than 1.20 for any variable of any of the regression analyses, providing confidence that this was not a significant concern.

Each trajectory combination is reported in Tables 3 and 4, with the three most meaningful comparisons shaded in each instance, i.e., whereby a favourable or unfavourable trajectory is compared with a stable "control group" trajectory (either Persistent High PTS/K6 or Resilient PTS/K6; shaded in Tables 3 and 4).

Hypothesis 1

We compared the Deteriorating trajectory with the Resilient trajectory for each of PTSD-8 and K6, to determine whether individuals who are separated from family had a less favourable trajectory of PTS and K6 symptoms across time, after controlling for age, gender, living with close family members, worry about close family members, family arrival since migration and a history of trauma. When compared to the Resilient class, membership of the Deteriorating trajectory class was not predicted by separation from close family for PTS and K6 respectively, contrary to Hypothesis 1. Older age, female gender, and living with close family members were, however, significant predictors of membership of the deteriorating trajectories for PTS and K6 symptoms (all ps < 0.05).

Next, we further investigated Hypothesis 1 by comparing the Persistent High trajectory class with the Resilient trajectory classes for each of PTSD-8 and K6. Again, separation from close family was not a significant predictor of membership of the unfavourable trajectory class (Persistent High) when compared to the Resilient trajectory class for either PTS or K6 symptoms. Older age, female gender, living with close family, and past trauma were significant predictors of Persistent High trajectory class membership for both PTS and K6 symptoms (all ps < 0.05), and worry about family was also a significant predictor of membership of the Persistent High trajectory class for PTS symptoms only (OR $= 1.75$, $p < 0.01$).

Hypothesis 2

We next compared the Improving trajectory class against the Persistent High trajectory class for PTS and K6 respectively, to determine whether individuals who had a family member arrive had a more favourable trajectory of psychological adjustment compared to those who did not, after controlling for age, gender, living with a close family member, having a close family member waiting, worrying about family or past trauma. The results showed that family arrival since migration was not a significant predictor of

membership of the Improving trajectory class for either PTS or K6 symptoms. However, living with a close family member was negatively associated with Improving trajectory class membership for both PTS and J6 symptoms (ORs = 0.57 & 0.53 respectively, *p*s < 0.05), and for K6 symptoms, participants with a close family member waiting in the country of origin was associated with reduced likelihood of Improving trajectory class membership when compared with the Persistent High trajectory group (OR = 0.54, $p < 0.05$).

Hypothesis 3

The abovementioned comparisons of the Deteriorating versus Resilient trajectory classes and the Persistent High versus Resilient trajectory classes were also informative for Hypothesis 3, i.e., that worry about separated family members would be associated with unfavourable symptom trajectories. After controlling for age, gender, living with close family members, close family members waiting, arrival of family members since migration and past trauma, worry about family was a significant predictor of membership of the Persistent High trajectory class for PTS symptoms (OR = 1.75, $p < 0.01$) and of the Deteriorating class for K6 symptoms (OR = 1.57, $p < 0.01$).

Discussion

Existing research on the postmigration environment has suggested that security of residency may be the key determinate of post-arrival trajectories of psychological symptoms in refugees. Family separation and worry about family members are important candidate variables worthy of additional investigation that may influence post-arrival mental health recovery trajectories. The current study sought to determine the impact of prolonged family separation on PTS and psychological distress in refugees resettled in Australia across a four year period.

The frequencies and course of symptom trajectories were consistent with that reported in a review of 54 studies of PTSD samples by Galatzer-Levy, Huang, & Bonanno, (2018),

which found chronic/persisting (pooled prevalence estimate 95% CI = 8.6%, 12.7%), delayed/increasing (95% CI = 5.3%, 13.3%), recovery/improving (95% CI = 16.2%, 25.8%), and resilient trajectories (95% CI = 61.6%, 69.8%). This leads to the interesting possibility that refugees may follow similar trajectories of PTSD symptoms as other trauma affected populations. A lack of integrative reviews precludes similar comparisons so far as psychological distress is concerned.

Our results are interesting in that demographic characteristics, chiefly older age and female gender, tended to be more consistent predictors of unfavourable trajectories than separation from family or worry about family members. Gender and age have had mixed findings with some studies reporting no association (e.g., Momartin et al., 2006), an others such as Nickerson et al. (2010) finding that gender explained a significant amount of variance in PTSD (5.8%) and depression (4.6%) symptoms respectively among refugees with family members in Iraq. The current findings support the importance of gender in leading to different post-migration mental health outcomes for some populations. In relation to age, while speculative, it is possible that older people have greater difficulty in learning new languages and adapting in a new country, which could have indirectly contributed to increased numbers of older refugees in the unfavourable trajectory groups.

We did not find support for the first hypothesis that individuals who are separated from family had less favourable trajectories of psychological symptoms. This is not to suggest that separation from family is not important, but rather, that in some circumstances other variables, such as worry about family members combined with family separation, may be associated with psychological symptoms when family members remain in the country of origin.

A counter-intuitive finding was that living with family members was in almost all cases associated with unfavourable trajectories of PTS symptoms and psychological distress,

thus leading to the rejection of our second hypothesis. This contrasts with previous findings (e.g., Birman & Tran, 2008). Although speculative, it is possible that there are fewer family members to support the family member in the country of origin if there are more family members living together in the post-settlement country, contributing to psychological symptoms and distress regarding a relatively isolated person in the country of origin. While living with family members may in some respects protect against psychological distress, there may nevertheless be additional financial pressures with supporting a larger family. An alternative possibility is that elevated levels of family conflict associated with stressors during the post-arrival phase may also contribute to unfavourable symptom trajectories (Timshel, Montgomery, & Dalgaard, 2017). Additional exploratory post-hoc analyses did not indicate that post-migration living difficulties explained this finding. Importantly, these findings do not suggest that social and interpersonal support is not important, but rather that there may be helpful and unhelpful domains of interpersonal support which may vary from one individual to another.

With regard to the third hypothesis, there was evidence to suggest that stress or worry about separated family members was contributing to PTS symptoms or levels of psychological distress. For PTS symptoms, worry about family increased the likelihood that a participant would be a member of a persistently high PTS symptom class compared to a resilient PTS symptom group after accounting for other variables, although the magnitude of this relationship was small. It is possible then, that worry about family members may serve to *maintain* existing PTS symptoms, but not necessarily otherwise play a part in the emergence or resolution of PTS symptoms, which may be better explained by other factors. We do however, acknowledge the complexity of our results in this respect. For instance, worry about family was a significant predictor of membership of the Persistent High compared with the Improving PTS trajectory groups and yet, it also predicted membership of the Improving

trajectory group when compared to the Resilient group. At least so far as persistent PTS symptoms are concerned, Fear for family may be tied to previous experiences of traumatic events which may manifest through intrusive thoughts and flashbacks over family members still remaining in dangerous conditions (Nickerson et al., 2010; Miller, 2018). Symptoms of restlessness, guilt, and nervousness may occur secondary to intrusive thoughts over past trauma, and interfere with the ability to cope with present and future stressors (Lindencrona, Ekblad, & Hauff, 2008).

For psychological distress, worry about family members was associated with greater likelihood of a *deterioration* of symptoms when compared to a resilient class, but not membership of a persistently high class. The magnitude of the relationship was small, with a 1.57 greater odds of membership in the deteriorating psychological distress symptoms group if a person endorsed worry about family members. Thus, worry about family members may be psychologically costly for people who otherwise have low levels of psychological distress upon arrival, but it may be less relevant in the maintenance of pre-existing high levels of psychological distress.

Our study is, to the best of our knowledge, the first to report the prospective trajectories of PTSD symptoms and psychological distress in a large representative refugee sample, a previous study derived from the same dataset notwithstanding (Reid & Berle, 2019). Although the study has evident strengths, it is not without its limitations. Even though non-western families typically consider a more inclusive definition of the family (Wilmsen, 2011), we were not able to account for the potential interaction effects of both the number and type of family members present. For instance, a minimum number of close family members (e.g., spouse or children) may need to be present to provide protective effects for psychological distress and PTS symptoms. Further, the variable used to assess the presence of fear for family was broad and included both worry about family and friends. This may reduce

the specificity of the findings, as it was not just limited to concerns about family. Worry about family was assessed only as present or absent and may not have captured differences in severity about family worry. Future studies should ideally use a continuous measure of a well-defined construct in this domain. Additionally, the absence and inconsistency in data collected across time (i.e. worry about family not measured at Wave 3) restricted consideration of our independent variables to Wave 1, limiting the tracking of family predictor variables across time. Consequently, determining whether worry about family was present at all waves or just Wave 1 was not possible. Similarly, although included in the dataset, the frequency and type of contact with family in the country of origin was not considered as it was unclear whether contact was limited to close family members in the country of origin or was inclusive of all family members. This may have influenced results particularly given the evidence to suggest that worry about family is heightened when contact back home is limited (Miller et al., 2018). We also note that the constraints imposed by our LCGA models may have resulted in different trajectories and patterns of class membership than a LGMM, if convergence using the LGMM approach were possible. Finally, our sample was heterogeneous and we could not control for the multitude of ways in which culturally-specific factors, such as the extent of family orientation, may have differed between subgroups within the sample. Still, we note that 75.5% of our sample of principal visa applicants were from three culturally similar countries: Iraq (35.1%), Afghanistan (29.8%) and Iran (10.6%).

This research has important implications for the treatment of psychopathology in refugees post-settlement. Interventions that target the cognitive process of worry, somatic arousal, and perception of control of fear may be helpful in the early phases of resettlement for refugees separated from family. Future research could also explore the interaction and

outcomes of worry that is productive (e.g. helping family in danger) compared with unproductive (e.g. rehashing experiences of the past).

The psychological effects of separation differ between individuals, however fear for family separated in migration appears to be an experience consistently reported by refugees. In the current study, worry about separated family members was associated with persistently high PTS symptom scores and deteriorations in psychological distress. This provides an additional and potentially modifiable variable for our understanding of the factors predicting persisting psychological symptoms post-settlement.

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Table 1. Demographic characteristics of principal applicants at Wave 1 (N = 1495)[a].

	N (%)
Female	443 (29.6%)
Country of Origin	
Iraq	525 (35.1%)
Afghanistan	446 (29.8%)
Iran	158 (10.6%)
Myanmar	97 (6.5%)
Other	269 (18.0%)
Family Status	
Lives with close family	851 (56.9%)
Separated from family	
Partner/spouse	185 (12.4%)
Child(ren)	255 (17.1%)
Parent	221 (14.9%)
Sibling	418 (28.1%)
Other family member	198 (13.3%)
Education	
6 years or less of school	300 (20.3%)
7-12 years of schooling	638 (43.1%)
Trade, technical or university qualification	283 (19.1%)
Employment	
Employed	133 (9.0%)
Not currently in paid work	1352 (91.0%)
Experienced trauma pre-arrival	1320 (91.9%)
Trauma Type	
Harsh living conditions	510 (35.5%)
War/Conflict	861 (60.0%)
Violence	322 (22.4%)
Imprisonment/Kidnapping	264 (18.4%)
Political/Religious Persecution	831 (57.9%)
Natural Disasters	95 (6.6%)
Other	263 (18.3%)

[a] Some variables had incomplete data, and percentages reflect the available sample.

Table 2. Incremental fit statistics and classification accuracy for latent class growth model for PTSD-8 total scores (N = 1495).

No. of classes	Loglikelihood (LL)	AIC	BIC	Sample size-adjusted BIC	CAIC	Entropy	BLRT *p*-value	VLMRLRT *p*-value	Sample size per class based on most likely class membership
1	-16717.12	33446.24	33478.10	33459.04	33459.28	-	-	-	1495
2	-16083.12	32184.25	32232.04	32203.45	32203.81	0.79	<0.001	<0.001	456/1039
3	-16007.91	32039.83	32103.55	32065.43	32065.91	0.71	<0.001	<0.001	441/167/887
4	-15924.26	31878.52	31958.17	31910.52	31911.13	0.74	<0.001	<0.001	275/172/860/188
5	-15899.49	31834.98	31930.56	31873.38	31874.11	0.73	<0.001	0.22	153/119/290/192/741
6	-15876.33	31794.67	31906.18	31839.46	31840.32	0.76	<0.001	0.68	86/733/326/181/97/72
7	-15815.68	31679.36	31806.80	31730.56	31731.54	0.75	<0.001	0.002	638/117/229/191/113/71/136

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; BLRT = Bootstrap Likelihood Ratio Test; CAIC = Consistent Akaike Information Criterion; K6 = Kessler-6 questionnaire; PTSD-8 = Post Traumatic Stress Disorder Scale - 8 items; VLMRLRT = Vuong-Lo-Mendell Rubin adjusted Likelihood Ratio Test.

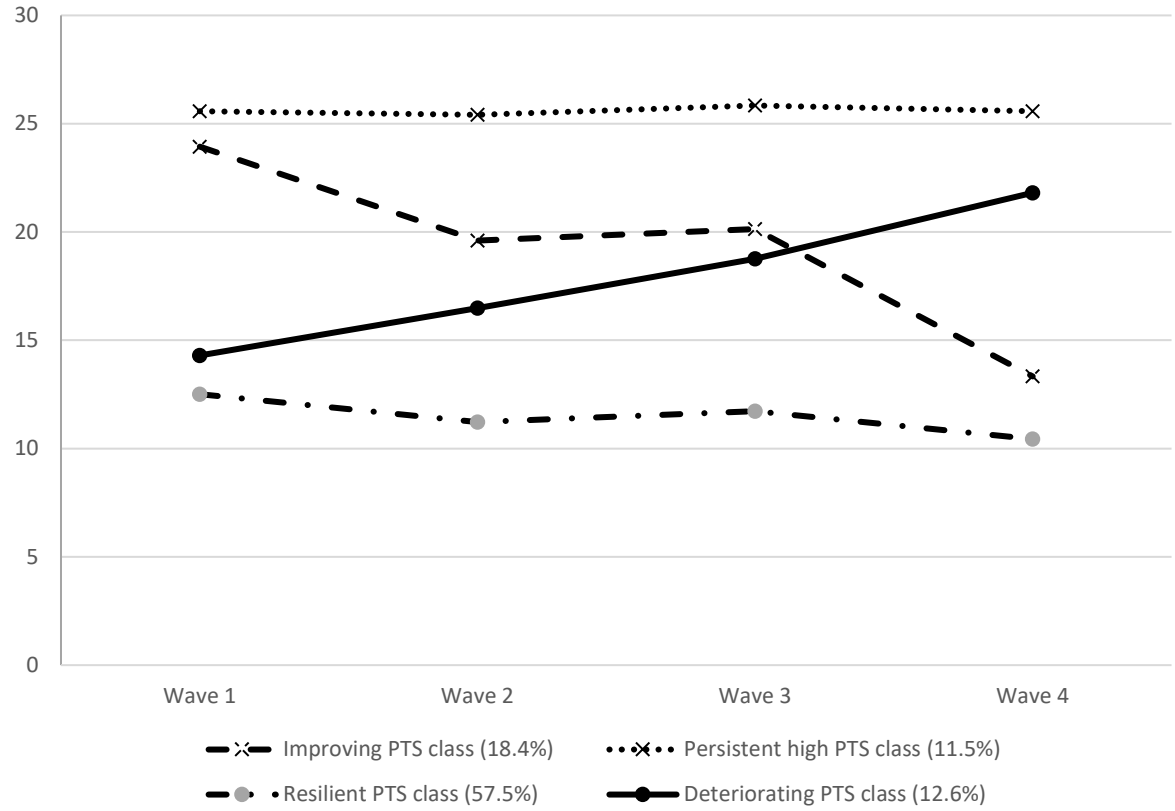

Figure 1. PTSD-8 symptom trajectories across the four waves of assessment (4 years).

Table 3. Incremental fit statistics and classification accuracy for latent class growth model for K6 total scores (N = 1495)..

No. of classes	Loglikelihood (LL)	AIC	BIC	Sample size-adjusted BIC	CAIC	Entropy	BLRT *p*-value	VLMRLRT *p*-value	Sample size per class based on most likely class membership
1	-16135.73	32283.47	32315.33	32296.27	32296.50	-		-	1495
2	-15555.07	31128.15	31175.94	31147.35	31147.71	0.79	<0.001	<0.001	368/1127
3	-15450.49	30924.98	30988.70	30950.58	30951.07	0.76	<0.001	0.001	96/420/979
4	-15357.35	30744.70	30824.35	30776.70	30777.31	0.76	<0.001	<0.001	104/259/914/218
5	-15329.12	30694.24	30789.81	30732.63	30733.37	0.74	<0.001	0.15	216/824/89/299/67
6	-15295.28	30632.57	30744.07	30677.36	30678.22	0.75	<0.001	0.08	237/796/88/91/60/223
7	-15272.49	30592.99	30720.43	30644.18	30645.16	0.76	<0.001	0.18	27/776/111/228/50//81/222

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; BLRT = Bootstrap Likelihood Ratio Test; CAIC = Consistent Akaike Information Criterion; K6 = Kessler-6 questionnaire; PTSD-8 = Post Traumatic Stress Disorder Scale - 8 items; VLMRLRT = Vuong-Lo-Mendell Rubin adjusted Likelihood Ratio Test.

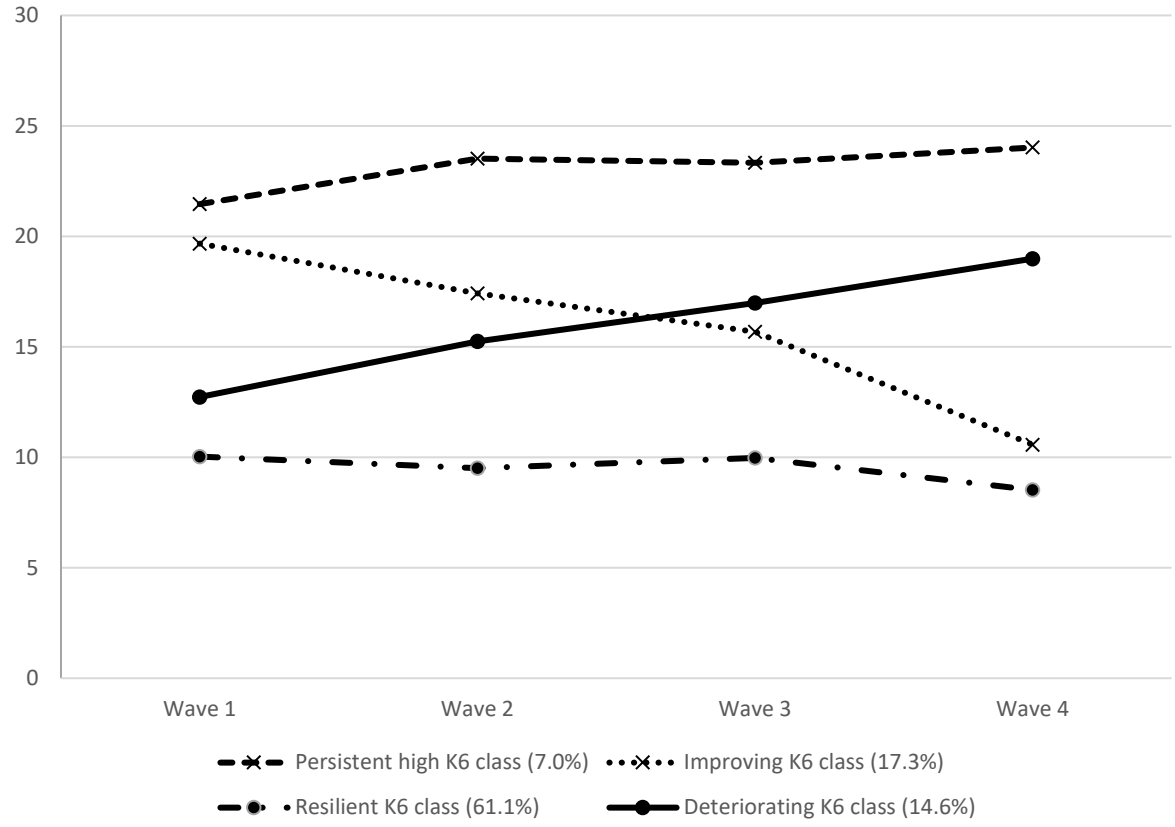

Figure 2. K6 symptom trajectories across the four waves of assessment (4 years).

Table 4. Multinomial regression analyses predicting the PTS trajectory class memberships. Key comparisons are shaded.

	Comparison group					
	Improving PTS trajectory		Persistent High PTS trajectory		Deteriorating PTS trajectory	
Reference group	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]
Persistent High PTS trajectory						
Age	-0.01 (0.01)	0.99 [0.97, 1.00]	-	-	-	-
Female gender	-0.32 (0.20)	0.73 [0.49, 1.09]	-	-	-	-
Lives with close family W1	-0.56 (0.24)*	0.57 [0.36, 0.91]	-	-	-	-
Close family waiting W1	0.14 (0.21)	1.15 [0.76, 1.73]	-	-	-	-
Worry about family W1	-0.09 (0.21)	0.91 [0.60, 1.38]	-	-	-	-
Family arrival since migration	0.17 (0.32)	1.19 [0.63, 2.22]	-	-	-	-
Past trauma	-0.52 (0.69)	0.59 [0.15, 2.28]	-	-	-	-
Deteriorating PTS trajectory						
Age	0.00 (0.01)	1.00 [0.99, 1.02]	0.02 (0.01)	1.02 [1.00, 1.03]	-	-
Female gender	0.10 (0.20)	1.11 [0.74, 1.65]	0.42 (0.22)	1.52 [0.98, 2.36]	-	-
Lives with close family W1	-0.12 (0.22)	0.89 [0.58, 1.35]	0.44 (0.26)	1.55 [0.94, 2.57]	-	-
Close family waiting W1	0.15 (0.20)	1.17 [0.78, 1.74]	0.02 (0.23)	1.02 [0.65, 1.59]	-	-
Worry about family W1	0.19 (0.20)	1.21 [0.81, 1.80]	0.28 (0.23)	1.32 [0.85, 2.07]	-	-
Family arrival since migration	0.00 (0.32)	1.00 [0.53, 1.88]	-0.17 (0.35)	0.84 [0.42, 1.67]	-	-
Past trauma	1.21 (0.44)**	3.34 [1.41, 7.90]	1.73 (0.64)**	5.63 [1.61, 19.61]	-	-
Resilient PTS trajectory						
Age	0.03 (0.01)**	1.03 [1.02, 1.04]	0.04 (0.01)***	1.04 [1.03, 1.06]	0.03 (0.01)***	1.03 [1.01, 1.04]
Female gender	0.47 (0.16)**	1.61 [1.18, 2.19]	0.79 (0.18)***	2.21 [1.54, 3.17]	0.37 (0.18)*	1.45 [1.02, 2.07]
Lives with close family W1	0.48 (0.16)**	1.61 [1.18, 2.20]	1.04 (0.21)***	2.82 [1.86, 4.29]	0.60 (0.19)**	1.82 [1.26, 2.62]
Close family waiting W1	-0.12 (0.15)	0.89 [0.66, 1.20]	-0.25 (0.19)	0.78 [0.54, 1.12]	-0.27 (0.18)	0.76 [0.54, 1.08]
Worry about family W1	0.47 (0.15)**	1.60 [1.18, 2.15]	0.56 (0.19)**	1.75 [1.21, 2.53]	0.28 (0.17)	1.32 [0.94, 1.86]
Family arrival since migration	0.07 (0.24)	1.07 [0.66, 1.73]	-0.10 (0.28)	0.90 [0.52, 1.57]	0.07 (0.28)	1.07 [0.62, 1.84]
Past trauma	1.27 (0.38)**	3.56 [1.68, 7.52]	1.79 (0.60)**	5.99 [1.84, 19.48]	0.06 (0.28)	1.06 [0.61, 1.85]

Note. CI = Confidence Interval, OR = Odds Ratio; W1 = Wave 1.
**p <.05, **p<.01, ***p<.001*

Table 5. Multinomial regression analyses predicting the K6 trajectory class memberships. Key comparisons are shaded.

	Comparison group					
	Improving K6 trajectory		Persistent High K6 trajectory		Deteriorating K6 trajectory	
Reference group	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]
Persistent High K6 trajectory						
Age	0.00 (0.01)	1.00 [0.98, 1.02]	-	-	-	-
Female gender	-0.32 (0.24)	0.73 [0.45, 1.17]	-	-	-	-
Lives with close family W1	-0.63 (0.28)*	0.53 [0.31, 0.92]	-	-	-	-
Close family waiting W1	-0.62 (0.25)*	0.54 [0.31, 0.92]	-	-	-	-
Worry about family W1	0.34 (0.25)	1.41 [0.86, 2.30]	-	-	-	-
Family arrival since migration	-0.54 (0.39)	0.58 [0.27, 1.24]	-	-	-	-
Past trauma	-1.47 (1.05)	0.23 [0.03, 1.81]	-	-	-	-
Deteriorating K6 trajectory						
Age	-0.01 (0.01)	0.99 [0.98, 1.01]	-0.01 (0.01)	0.99 [0.97, 1.01]	-	-
Female gender	0.04 (0.19)	1.04 [0.71, 1.52]	0.36 (0.25)	1.43 [0.88, 2.33]	-	-
Lives with close family W1	-0.42 (0.21)	0.66 [0.44, 0.99]	0.21 (0.29)	1.24 [0.70, 2.19]	-	-
Close family waiting W1	-0.01 (0.20)	0.98 [0.67, 1.45]	0.60 (0.26)*	1.82 [1.10, 3.02]	-	-
Worry about family W1	-0.05 (0.20)	0.95 [0.64, 1.40]	-0.40 (0.26)	0.67 [0.41, 1.11]	-	-
Family arrival since migration	-0.42 (0.30)	0.66 [0.37, 1.17]	0.12 (0.41)	1.13 [0.50, 2.52]	-	-
Past trauma	0.77 (0.40)	2.16 [0.99, 4.71]	2.24 (1.04)*	9.41 [1.23, 71.98]	-	-
Resilient K6 trajectory						
Age	0.03 (001)***	1.03 [1.01, 1.04]	0.03 (0.01)**	1.03 [1.01, 1.04]	0.03 (0.01)***	1.03 [1.02, 1.05]
Female gender	0.68 (0.16)***	1.97 [1.45, 2.68]	1.00 (0.22)***	2.72 [1.76, 4.19]	0.64 (0.17)***	1.90 [1.37, 2.63]
Lives with close family W1	0.22 (0.16)	1.25 [0.91, 1.71]	0.85 (0.26)**	2.34 [1.42, 3.87]	0.64 (0.18)***	1.90 [1.34, 2.69]
Close family waiting W1	-0.23 (0.15)	0.80 [0.59, 1.08]	0.39 (0.23)	1.48 [0.94, 2.32]	-0.21 (0.17)	0.81 [0.59, 1.13]
Worry about family W1	0.40 (0.15)*	1.48 [1.10, 2.01]	0.05 (0.23)	1.05 [0.68, 1.64]	0.45 (0.17)**	1.57 [1.13, 2.17]
Family arrival since migration	-0.45 (0.22)*	0.63 [0.41, 0.98]	0.09 (0.36)	1.09 [0.53, 2.23]	-0.03 (0.26)	0.97 [0.58, 1.62]
Past trauma	0.84 (0.33)*	2.31 [1.20, 4.46]	2.31 (1.02)*	10.11 [1.38, 74.04]	0.07 (0.28)	1.07 [0.62, 1.86]

Note. CI = Confidence Interval, OR = Odds Ratio; W1 = Wave 1.
**p <.05, **p<.01, ***p<.001*

The impact of family separation and worry about family upon psychological adjustment in refugees resettled in Australia

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Abstract

Few reliable predictors of post-arrival psychological adjustment have been identified for refugees once they arrive in their host country. We investigated the relationship between family separation and psychological symptoms in refugees resettled in Australia from 2013-2016. Participants were 1495 adult refugees (*M* = 38.9yrs, *SD* = 12.7) who participated in the Building a New Life in Australia (BNLA) population-based study across a four-year period. Participants were assessed for psychological distress (using the Kessler-6 [K6]) and Posttraumatic Stress (PTS) symptoms (using the Posttraumatic Stress Disorder – 8 [PTSD-8]). Latent class growth analysis (LCGA) was used to identify latent longitudinal trajectories and binary logistic regression was used to assess the contribution of family predictor variables towards PTSD-8 and K6 trajectory class membership. LCGA supported a 4-trajectory class solution for Posttraumatic Stress symptoms: "Improving Posttraumatic Stress (PTS) symptoms" (18.4%), "Persistent High PTS" (11.5%), "Resilient PTS" (57.3%), and "Deteriorating PTS" (12.6%). For K6, LCGA supported a 4-class solution: "Persistent High K6" (7.0%), "Improving K6" (17.3%), "Resilient K6" (61.1%) and "Deteriorating K6" (14.6%). Separation from family members did not independently predict the course of psychological symptoms. In contrast, worry about family and friends contributed to the persistence of high PTSD-8 and deteriorating K6 scores. The current findings suggest that, rather than separation alone, unfavourable trajectories of psychological symptoms during the post-settlement phase may instead be defined by worry about family and friends in addition to older age and female gender.

Keywords: Refugees; resettlement; Posttraumatic Stress; trauma; family; separation; worry; psychological distress.

In the most recent United Nations High Commissioner for Refugees Report it was found that the number of refugees reached has reached 25.9 million people worldwide (UNHCR, 2018). Refugees are often exposed to war, political instability, violence, and displacement in their country of origin (Fazel, Wheeler, & Denesh, 2005), rendering them a highly vulnerable population. This vulnerability is reflected in high rates of estimated psychological disorders in refugees during the post-settlement period, namely post-traumatic stress disorder (PTSD; between 8 and 37% in Slewa-Younan, Guajardo, Heriseanu, & Hasan, 2015), depression (between 28 and 75% in Slewa-Younan et al), anxiety (21% in Alexander, David & Grills, 2013), and prolonged grief disorder (9% in Steil et al., 2019), the large between-study variability in estimates notwithstanding.

Understanding the factors which predict optimal post-settlement psychological adjustment is important for ensuring that refugees have the opportunity for fulfilling and productive lives. To date, the primary post-settlement factor that has consistently been found to predict psychological adjustment following arrival in a host country has been security of residency. For instance, a prospective study of asylum seekers found that those who received a positive outcome reported substantial improvements in PTSD, depression and anxiety symptoms compared to those who remained in uncertainty, after controlling for premigration trauma (Silove et al., 2007), consistent with a slew of similar studies (e.g., Jakobsen, Meyer DeMott, Wentzel-Larsen, & Heir, 2017; Momartin et al., 2006). Thus, persistence of Posttraumatic Stress (PTS) symptoms and psychological distress may be a reflection of these factors.

Alongside these recognised factors, there is an emerging recognition that family separation may also play a key part in post-arrival PTSD and psychological distress (Miller, Hess, Bybee, & Goodkind, 2018; Schweitzer et al., 2006; Simich, Este, & Hamilton, 2010; see Li, Liddell & Nickerson, 2016 for a review). Families are frequently separated in the

process of migration as a consequence of forced displacement (Jenkinson, Silbert, De Maio, & Edwards, 2016) or from migration policies of the host country (Wilmsen, 2013). Rousseau, Mekki-Berrada, and Moreau (2001) documented the nature of separation in refugees, and found that approximately 20% of families migrated with all members present, and were separated for 3.5 years on average. Broadly, research indicates that the aversive effects of pre-migration trauma are reinforced when family members are separated, creating a compounding stress effect (Rousseau et al., 2001; Beiser & Hou, 2001). Likewise, the consequences of separation may be exacerbated by the absence of family members who otherwise serve as a protective factor in the post-settlement country (Rousseau et al., 2001; Wilmsen, 2013). Specifically, there is research to suggest that the presence of a family member in the post-migration country can reduce levels of depression (Birman & Tran, 2008), and mitigate the psychological impacts of migration stress (Rousseau et al., 2001; Wilmsen, 2011).

Of critical importance in determining the impact of family separation is the nature and reasons for the persistence of family separation. In some cases, separation may be a considered decision on the part of the refugee and their family, and may not have a harmful influence on mental health. On the other hand, if separation is involuntary and associated with worry for the welfare of family members, then the psychological consequences are presumably more significant. This relationship between involuntary separation and psychopathology is reflected in the literature, which suggests that worry about family may be a critical contributor to symptoms of psychological distress and PTSD. Schweitzer et al. (2006) explored post-migration factors, pre-migration trauma, and social support on psychological outcomes, and found that worry about family separated in migration alongside communication difficulties were of greatest concern for Sudanese refugees resettled in

Australia. Notably, post-migration experiences of worry about family contributed to depression, anxiety, and PTSD in as much as the effects of pre-migration trauma.

Nickerson et al. (2010) explored psychopathology in the context of ongoing family separation, and found that intrusive fears for immediate family members remaining in Iraq predicted increased levels of PTSD and depression after accounting for pre-migration trauma. Similarly, Simich et al. (2010) explored family and social factors on Sudanese refugees' mental health in a community based study. The results indicated that worry about family in the country of origin was the greatest stressor for refugees in the first year of resettlement, a finding also mirrored by Steel et al. (2006). Finally, qualitative reports of family separation have documented the relationship between prior and ongoing experiences of trauma and worry about family (Rousseau et al., 2001; Wilmsen, 2013). The literature suggests that it may be worry about family, rather than separation per se, that drives unfavourable psychological consequences for an individual. Worry about family may serve to maintain a current sense of threat, and in turn, PTSD symptoms or symptoms of psychological distress.

The current study aimed to explore the relative contribution of family separation and worry about family on psychopathology in refugees. Despite the emerging evidence to suggest a relationship between family separation and psychological adjustment, studies in this area have been predominantly cross-sectional (Rousseau et al., 2001; Schweitzer et al., 2006; Simich et al., 2010; & Wilmsen 2013) or retrospective (Birman & Tran, 2008; Nickerson et al., 2010) with an absence of prospective research which specifically addresses the long-term relationship between family separation and psychological symptoms in refugees. To address this question, we report data from the first 3-years of the Building a New Life in Australia (BNLA) study, a large, representative cohort study of recently arrived refugees in Australia.

The aforementioned literature suggests that the psychological functioning of refugees is compromised by family separation (e.g. Schweitzer et al., 2006; Wilmsen, 2013), and protected by the presence of family. This lead to the following hypotheses:

1. Individuals who are separated from family will have a less favourable trajectory of psychological distress and PTS across time.
2. Individuals who have a family member arrive from the country of origin during the follow up period will have a more favourable trajectory of psychological adjustment compared with those who do not, on the basis that a reduction of family members at potential risk in the country of origin would be associated with more favourable levels of psychological symptoms.
3. In line with emerging research suggesting that worry about separated family members may be associated with greater PTS and depression symptoms, we also hypothesised that worry about family would be associated with unfavourable trajectories of PTS and psychological distress symptoms respectively.

Method

The BNLA study is a population based, longitudinal study conducted on refugees granted humanitarian visas in Australia. The initial wave of data collection began in October 2013 and data was collected annually between October and February from 2013-2017. This report is derived from the first four waves of data. Data collection alternated between face-to-face interviews (administered by an interviewer or by self-interview on a computer) and telephone interviews. Participants were required to answer questions on a range of domains, including demographic information, housing, language, proficiency, education, employment and income, pre-migration experiences, health, self-sufficiency, community support, life satisfaction, and life in Australia. Interview questions were translated into multiple languages or completed with an interviewer who was matched to the participants' native language.

Ethics approval was obtained through the (blinded for peer review) Human Research Ethics Committee and the Institutional Review Board (Blinded for review).

Participants and Procedure

The study participants were 2399 humanitarian migrants from the BNLA study, aged 15-83 years and granted permanent humanitarian visas in Australia. Humanitarian visas were granted to individuals and migrating units (MU's) 3-6 months prior to completing the survey. Migrating units consisted of principal applicants (lead applicant for the MU) and secondary applicants (other members of the MU aged 15 years and over) named on the same visa application. The participants were from 35 different countries and varying cultural backgrounds. Participants were recruited from 11 different sites around Australia, including regional areas and major cities. Of the 2399 participants, 1509 participants were principal applicants and 890 were secondary applicants. Analyses only focused on principal applicants to avoid the risk of analysing multiple members of the same family.

Measures

The Post Traumatic Stress Disorder Scale - 8 items (PTSD-8; Hansen, et al., 2010) was used to assess PTS (intrusion, avoidance, hypervigilance). The PTSD-8 was derived from the Harvard Trauma Questionnaire (HTQ), and has demonstrated strong psychometrics (Hansen, et al., 2010). Symptoms were assessed over the past week on a 4-point Likert scale (Hansen, et al., 2010). In the current study, the PTSD-8 demonstrated adequate internal consistency (Cronbach's α) ranging from .92 to .94 across the four waves.

The Kessler Psychological Distress Scale - 6 item (K6; Kessler, et al., 2003) was used to assess psychological distress over the past month (e.g. nervousness, hopelessness, restlessness, worthlessness; Mewton, et al., 2016). The Australian version of the K6 consists of six questions scored on a 5-point scale, and total scores are obtained by summing the individual item scores. The K6 has been translated into multiple languages and used cross-

culturally for measuring nonspecific psychological distress (Kessler, et al., 2010). In the current study, the K6 demonstrated good internal consistency (Cronbach's α) ranging from .87 to .90 across all four waves.

A range of other demographic, occupational and migration-related items were administered at each wave of assessment. However, for the present research, we focused on six key variables: 1. participant gender, 2. participant age, 3. whether the participant was living with close family members at Wave 1 (i.e., partner, child, parent or sibling from the same migrating unit; yes/no), 4. Whether family were waiting in the country of origin (yes/no), 5. Worry about family or friends overseas (yes/no), 6. Whether additional family members had arrived since migration by Wave 1 (yes/no). We focused on Wave 1 variables for our analyses as we wanted to know the prospective value of each respective variable for the subsequent course of PTS and K6 symptoms and because not all variables were assessed at each wave.

Data Analysis

The study is a within-groups design with participants completing the questionnaires at each of the four time points. A population sampling weighting was not applied as we were interested in the relationships within and between participants within the sample rather than estimates about the overall population. Descriptive statistics including the mean, standard deviation, and frequencies were used to summarise the demographic information of the study participants at Wave 1 and are displayed in Table 1. The PTSD-8 and K6 were modelled as numerical interval measures.

The number of principal applicants with complete data for the PTSD-8 were 1443 (96.5%), 1246 (83.3%), 1124 (75.2%) and 1154 (77.2%) at waves 1 to 4 respectively; and for the K6, 1457 (97.5%), 1264 (84.5%), 1140 (76.3%) and 1168 (78.1%) for waves 1 to 4

respectively. Little's MCAR test indicated that values for the K6 and PTSD-8 were missing at random across the four waves ($\chi^2 = 244.45$, $df = 215$, $p = 0.08$).

Latent growth modelling analysis

We used a latent growth modelling approach to determine whether latent classes could be identified for groups of participants with similar trajectories of K6 and PTSD-8 symptoms across each annual wave of assessment. This approach divides the trajectories of groups of participants into mutually exclusive and exhaustive classes (Collins & Lanza, 2010), which are "latent" in that class membership is not directly observed or measured (O'Donnell, et al., 2017). We thus ran Latent Growth Mixture Models (LGMM) for K6 and PTSD-8 symptoms respectively. The resulting models did not converge when a full LGMM was applied for each of the PTSD-8 and K6. These problems with the LGMM persisted when we used a Bayes estimator (which more often achieves convergence than maximum likelihood approaches; Asparouhov & Muthen, 2010) and also when the number of iterations and random starts were varied.

Hence we proceeded to specify latent class growth analysis (LCGA) models which are a specific case of LGMM whereby the within class variance for both intercept and slope values are set to zero (Frankfurt, Frazier, Syed, & Jung, 2016). To build the LCGA models we commenced with an intercept-only model, before extending the analyses to include slope as well as increasing numbers of classes which was able to achieve convergence for PTSD and K6 models. Covariance coverage for pairs of variables were all above the minimum .10 for model convergence (PTSD-8, .66-.97; K6, .68-.98) (Muthén & Muthén, 1998-2012).

The number of classes was determined partly on the basis of theory (parsimony being favoured), and partly on the basis of a number of fit indices. The Akaike Information Criterion (AIC, Akaike, 1974) and Bayesian Information Criterion (BIC, Schwarz, 1978), Sample size-adjusted BIC (Sclove, 1987) and Consistent Akaike Information Criterion

(Bozdogan, 1987) goodness of fit indices were considered, where lower values correspond to improved model fit. We also report the results of two likelihood ratio tests: the Bootstrap Likelihood Ratio Test (BLRT; McLachlin & Peel, 2000) and the Vuong-Lo-Mendell Likelihood Ratio Test (Lo, Mendell & Rubin, 2001), which provide a p-value which indicates if a model fits the data better than a model with one less class (Nylund, Asparouhov, & Muthén, 2007). The entropy values, which indicate the classification accuracy of a solution, are also reported with values closer to 1 indicating relatively stronger class classification accuracy (Geiser, 2010). Finally, in line with the approach of other researchers (e.g., Andruff et al., 2009; Infurna & Grimm, 2018), classes comprising less than 5% of the overall sample were considered less favourable on the basis that such solutions can be unstable. Analyses were conducted in Mplus version 7.31 (Muthén & Muthén, 1998-2012). All models included an intercept and slope term, and the number of random starts was set to 1000, and with 200 optimisations for the final stage of analysis. Mplus uses a Full Information Maximum Likelihood (FIML) approach to handling missing data as default (Muthén & Muthén, 1998-2012). Consistent with the LCGA approach, all within class variances were set to zero (Jung & Wickrama, 2008).

The binary comparisons reported as part of the multinomial regression analyses were used to estimate the odds of falling within a particular PTS or K6 trajectory class membership. Predictor variables were added simultaneously into the regression model. In each case, the "reference" category corresponded to an absence of the respective variable (e.g., "0" corresponded to an absence of family members who had arrived). Predictors included the demographic characteristics of age and gender, and post-migration family variables at Wave 1. Gender was included on the basis that previous research suggests that gender is predictive of PTSD symptoms in a sample of refugees from Iraq (Nickerson et al., 2010) – such that there may be gender differences in PTSD trajectories. Gender differences in

psychological distress reported by refugees has also been reported (Chung et al., 1998). Age was included on the basis that the risk of lifetime trauma exposure (and by extension, PTSD symptoms) increases with age and given that psychological distress levels also vary across the age span. (Jorm et al., 2005). Post-migration predictor variables included family waiting to migrate (including extended family members), living with family, worry about family and friends, and arrival of family members since migration (see Table 3 and 5). We used wave 1 variables noting that assessment of some of these variables changed across subsequent waves of the study.

Next Multinomial logistic regression analyses were conducted using IBM SPSS Statistics version 26, after the most likely class membership for each participant was extracted from Mplus. For our primary analyses, close family members were considered to be partners, parents, children or siblings of the participant. We also repeated the regression analyses when considering separation of extended family members (i.e., grandparents, aunts/uncles, cousins and other). Principal applicants who were missing all four waves of data from either the PTSD-8 or K6 scale were excluded from the data analysis. These participants were excluded on the basis that Mplus analyses cannot be conducted on participants who are missing data on the dependent variable at all time points, but can run analyses on those participants missing data at one or two time points. Of the 1509 principal applicants, 1495 were then included for data analysis in Mplus. For consistency across analyses, all further data analysis was conducted on the 1,495 participants.

Results

Participant Profile

The social and demographic characteristics of the participants are summarised in Table 1. The sample used for analysis consisted of 1495 participants of whom 1052 were male 70.4%), consistent with the gender mix of principal visa applicants.

The mean age was 36.86 years (*SD* = 12.66, *Mdn* = 34, range 18-75yrs). Prior to migration, 91.5% of participants reported exposure to trauma. The majority of participants (72.7%) had arrived in Australia less than 5 months prior to the first interview. Family separation from a spouse or partner was reported by 12.4% of responders and separation from children 17.1%. The proportion of the sample at Waves 2, 3 and 4 who reported that a family member had arrived from overseas since the preceding timepoint were 11.4%, 12.5%, and 19.3% respectively.

Worry about family and friends overseas (52.2%) was the second most frequent reported post-migration stressor following language barriers (57.7%). Scores for the PTSD-8 and K6 questionnaires were relatively stable across each wave of the study, ranging between 14.61 and 16.37 for the PTSD-8, and between 11.82 and 12.90 for the K6 (see Table S1 of the supplementary material for Means and SDs).

There was relatively small variation in the length of interval between each of the assessment points across the sample (Mean number of months from Wave 1 to Wave 2 = 10.9, *SD* = 1.7; from Wave 2 to Wave 3 = 12.27, *SD* = 1.5; and from Wave 3 to Wave 4 = 12.10, *SD* = 1.2). Analyses used assessment points (1, 2, 3, and 4) rather than the number of months between assessments as the time-related variable as assessment date was recorded to the nearest month, precluding precise time-interval estimates between assessments.

Preliminary analyses investigated whether the course of PTS and psychological distress symptoms for the overall sample were best described by linear or quadratic trajectories. The quadratic model for each of PTSD-8 and K6 symptoms converged when applying a Bayes estimator, with (lower) BIC values for PTSD and K6 indicating that a linear trajectory best described the data in each case: the BIC values for PTSD-8 were 32320.76 (linear) and 32340.65 (quadratic) respectively; and the BIC values for K6 were 31221.29 (linear) and 31222.84 (quadratic) respectively.

Posttraumatic Stress symptoms (PTS) LCGA model

Table 2 reports the absolute model fit, classification accuracy, and relative model fit statistics for PTSD-8 trajectory class memberships. Classes were progressively entered from a 1-class solution to a 7-class solution. The values of absolute fit indices continued to decrease with consecutive classes however, this is not unusual for latent class analyses (Nylund-Gibson & Choi, 2018). Likewise, the BLRT remained significant for each class solution. The 6 and 7 class solutions each included classes which comprised less than 5% of the overall sample and the five class solution did not appear to add explanatory value beyond the 4-class solution in that, for the five class solution, two of the classes from the 4-class solution appeared to split into separate but parallel decreasing trajectories. Since the VLMRLRT value was not significant for five or more classes, and given that previous post-trauma trajectory studies have tended to identify four similar trajectory classes (e.g., Bonanno et al., 2012), we selected the 4-class solution for PTSD-8 class membership as the best fit to the data (VLMRLRT $p < .05$). While the initial four class solution indicated local maxima, we were able to replicate the loglikelihood twice with larger random starting values (using 80 and 16, and 160 and 32 sets of first step optimisations and largest log likelihood values respectively). We describe the classes of participants as: Class 1 “Improving PTS” ($n = 275$, 18.4%), Class 2 “Persistent High PTS” ($n = 172$, 11.5%), Class 3 “Resilient PTS” ($n = 860$, 57.3%), Class 4 “Deteriorating PTS” ($n = 188$, 12.6%). Figure 1 provides a visual representation of the four classes of PTSD-8 symptom trajectories.

Psychological Distress LCGA model

Table 3 summarises the absolute model fit, classification accuracy, and relative model fit statistics for K6 trajectory class memberships. Fit indices continued to decrease in value across successive classes and the BLRT remained significant for each successive class solution, up to and including 7 classes. Nonetheless, when graphed, there appeared to be a

distinct change in gradient of the decreasing BIC values at the four-class solution (Nylund-Gibson & Choi, 2018), each solution beyond 4 classes included at least one class with <5% of the overall sample, and the VLMRLRT value was not significant for five or more classes, suggesting that a 4-class solution for K6 class membership was best supported by the data ($p < .0001$).

Latent class growth analysis revealed four classes of participants: Class 1 "Persistent High K6" ($n = 104$, 7.0%), Class 2 "Improving K6" ($n = 259$, 17.3%), Class 3 "Resilient K6" ($n = 914$, 61.1%) and Class 4 "Deteriorating K6" ($n = 218$, 14.6%). While the initial four class solution indicated local maxima, we were able to replicate the loglikelihood twice with larger random starting values (using 80 and 16, and 160 and 32 sets of first step optimisations and largest log likelihood values respectively). A visual representation of the four K6 symptom class trajectories are shown in Figure 2.

Multinomial regression results: predictors of trajectory class membership

Multinomial logistic regression analyses were used to assess the contributions of demographic factors and post-migration stressors on PTSD-8 and K6 class memberships respectively. Given the possibility of multicollinearity between some of the variables in the analysis, variance inflation factor values were reviewed in SPSS. No variance inflation factor value was greater than 1.20 for any variable of any of the regression analyses, providing confidence that this was not a significant concern.

Each trajectory combination is reported in Tables 3 and 4, with the three most meaningful comparisons shaded in each instance, i.e., whereby a favourable or unfavourable trajectory is compared with a stable "control group" trajectory (either Persistent High PTS/K6 or Resilient PTS/K6; shaded in Tables 3 and 4).

Hypothesis 1

We compared the Deteriorating trajectory with the Resilient trajectory for each of PTSD-8 and K6, to determine whether individuals who are separated from family had a less favourable trajectory of PTS and K6 symptoms across time, after controlling for age, gender, living with close family members, worry about close family members, family arrival since migration and a history of trauma. When compared to the Resilient class, membership of the Deteriorating trajectory class was not predicted by separation from close family for PTS and K6 respectively, contrary to Hypothesis 1. Older age, female gender, and living with close family members were, however, significant predictors of membership of the deteriorating trajectories for PTS and K6 symptoms (all ps < 0.05).

Next, we further investigated Hypothesis 1 by comparing the Persistent High trajectory class with the Resilient trajectory classes for each of PTSD-8 and K6. Again, separation from close family was not a significant predictor of membership of the unfavourable trajectory class (Persistent High) when compared to the Resilient trajectory class for either PTS or K6 symptoms. Older age, female gender, living with close family, and past trauma were significant predictors of Persistent High trajectory class membership for both PTS and K6 symptoms (all ps < 0.05), and worry about family was also a significant predictor of membership of the Persistent High trajectory class for PTS symptoms only (OR $= 1.75$, $p < 0.01$).

Hypothesis 2

We next compared the Improving trajectory class against the Persistent High trajectory class for PTS and K6 respectively, to determine whether individuals who had a family member arrive had a more favourable trajectory of psychological adjustment compared to those who did not, after controlling for age, gender, living with a close family member, having a close family member waiting, worrying about family or past trauma. The results showed that family arrival since migration was not a significant predictor of

membership of the Improving trajectory class for either PTS or K6 symptoms. However, living with a close family member was negatively associated with Improving trajectory class membership for both PTS and J6 symptoms (ORs = 0.57 & 0.53 respectively, *p*s < 0.05), and for K6 symptoms, participants with a close family member waiting in the country of origin was associated with reduced likelihood of Improving trajectory class membership when compared with the Persistent High trajectory group (OR = 0.54, $p < 0.05$).

Hypothesis 3

The abovementioned comparisons of the Deteriorating versus Resilient trajectory classes and the Persistent High versus Resilient trajectory classes were also informative for Hypothesis 3, i.e., that worry about separated family members would be associated with unfavourable symptom trajectories. After controlling for age, gender, living with close family members, close family members waiting, arrival of family members since migration and past trauma, worry about family was a significant predictor of membership of the Persistent High trajectory class for PTS symptoms (OR = 1.75, $p < 0.01$) and of the Deteriorating class for K6 symptoms (OR = 1.57, $p < 0.01$).

Discussion

Existing research on the postmigration environment has suggested that security of residency may be the key determinate of post-arrival trajectories of psychological symptoms in refugees. Family separation and worry about family members are important candidate variables worthy of additional investigation that may influence post-arrival mental health recovery trajectories. The current study sought to determine the impact of prolonged family separation on PTS and psychological distress in refugees resettled in Australia across a four year period.

The frequencies and course of symptom trajectories were consistent with that reported in a review of 54 studies of PTSD samples by Galatzer-Levy, Huang, & Bonanno, (2018),

which found chronic/persisting (pooled prevalence estimate 95% CI = 8.6%, 12.7%), delayed/increasing (95% CI = 5.3%, 13.3%), recovery/improving (95% CI = 16.2%, 25.8%), and resilient trajectories (95% CI = 61.6%, 69.8%). This leads to the interesting possibility that refugees may follow similar trajectories of PTSD symptoms as other trauma affected populations. A lack of integrative reviews precludes similar comparisons so far as psychological distress is concerned.

Our results are interesting in that demographic characteristics, chiefly older age and female gender, tended to be more consistent predictors of unfavourable trajectories than separation from family or worry about family members. Gender and age have had mixed findings with some studies reporting no association (e.g., Momartin et al., 2006), an others such as Nickerson et al. (2010) finding that gender explained a significant amount of variance in PTSD (5.8%) and depression (4.6%) symptoms respectively among refugees with family members in Iraq. The current findings support the importance of gender in leading to different post-migration mental health outcomes for some populations. In relation to age, while speculative, it is possible that older people have greater difficulty in learning new languages and adapting in a new country, which could have indirectly contributed to increased numbers of older refugees in the unfavourable trajectory groups.

We did not find support for the first hypothesis that individuals who are separated from family had less favourable trajectories of psychological symptoms. This is not to suggest that separation from family is not important, but rather, that in some circumstances other variables, such as worry about family members combined with family separation, may be associated with psychological symptoms when family members remain in the country of origin.

A counter-intuitive finding was that living with family members was in almost all cases associated with unfavourable trajectories of PTS symptoms and psychological distress,

thus leading to the rejection of our second hypothesis. This contrasts with previous findings (e.g., Birman & Tran, 2008). Although speculative, it is possible that there are fewer family members to support the family member in the country of origin if there are more family members living together in the post-settlement country, contributing to psychological symptoms and distress regarding a relatively isolated person in the country of origin. While living with family members may in some respects protect against psychological distress, there may nevertheless be additional financial pressures with supporting a larger family. An alternative possibility is that elevated levels of family conflict associated with stressors during the post-arrival phase may also contribute to unfavourable symptom trajectories (Timshel, Montgomery, & Dalgaard, 2017). Additional exploratory post-hoc analyses did not indicate that post-migration living difficulties explained this finding. Importantly, these findings do not suggest that social and interpersonal support is not important, but rather that there may be helpful and unhelpful domains of interpersonal support which may vary from one individual to another.

With regard to the third hypothesis, there was evidence to suggest that stress or worry about separated family members was contributing to PTS symptoms or levels of psychological distress. For PTS symptoms, worry about family increased the likelihood that a participant would be a member of a persistently high PTS symptom class compared to a resilient PTS symptom group after accounting for other variables, although the magnitude of this relationship was small. It is possible then, that worry about family members may serve to *maintain* existing PTS symptoms, but not necessarily otherwise play a part in the emergence or resolution of PTS symptoms, which may be better explained by other factors. We do however, acknowledge the complexity of our results in this respect. For instance, worry about family was a significant predictor of membership of the Persistent High compared with the Improving PTS trajectory groups and yet, it also predicted membership of the Improving

trajectory group when compared to the Resilient group. At least so far as persistent PTS symptoms are concerned, Fear for family may be tied to previous experiences of traumatic events which may manifest through intrusive thoughts and flashbacks over family members still remaining in dangerous conditions (Nickerson et al., 2010; Miller, 2018). Symptoms of restlessness, guilt, and nervousness may occur secondary to intrusive thoughts over past trauma, and interfere with the ability to cope with present and future stressors (Lindencrona, Ekblad, & Hauff, 2008).

For psychological distress, worry about family members was associated with greater likelihood of a *deterioration* of symptoms when compared to a resilient class, but not membership of a persistently high class. The magnitude of the relationship was small, with a 1.57 greater odds of membership in the deteriorating psychological distress symptoms group if a person endorsed worry about family members. Thus, worry about family members may be psychologically costly for people who otherwise have low levels of psychological distress upon arrival, but it may be less relevant in the maintenance of pre-existing high levels of psychological distress.

Our study is, to the best of our knowledge, the first to report the prospective trajectories of PTSD symptoms and psychological distress in a large representative refugee sample, a previous study derived from the same dataset notwithstanding (Reid & Berle, 2019). Although the study has evident strengths, it is not without its limitations. Even though non-western families typically consider a more inclusive definition of the family (Wilmsen, 2011), we were not able to account for the potential interaction effects of both the number and type of family members present. For instance, a minimum number of close family members (e.g., spouse or children) may need to be present to provide protective effects for psychological distress and PTS symptoms. Further, the variable used to assess the presence of fear for family was broad and included both worry about family and friends. This may reduce

the specificity of the findings, as it was not just limited to concerns about family. Worry about family was assessed only as present or absent and may not have captured differences in severity about family worry. Future studies should ideally use a continuous measure of a well-defined construct in this domain. Additionally, the absence and inconsistency in data collected across time (i.e. worry about family not measured at Wave 3) restricted consideration of our independent variables to Wave 1, limiting the tracking of family predictor variables across time. Consequently, determining whether worry about family was present at all waves or just Wave 1 was not possible. Similarly, although included in the dataset, the frequency and type of contact with family in the country of origin was not considered as it was unclear whether contact was limited to close family members in the country of origin or was inclusive of all family members. This may have influenced results particularly given the evidence to suggest that worry about family is heightened when contact back home is limited (Miller et al., 2018). We also note that the constraints imposed by our LCGA models may have resulted in different trajectories and patterns of class membership than a LGMM, if convergence using the LGMM approach were possible. Finally, our sample was heterogeneous and we could not control for the multitude of ways in which culturally-specific factors, such as the extent of family orientation, may have differed between subgroups within the sample. Still, we note that 75.5% of our sample of principal visa applicants were from three culturally similar countries: Iraq (35.1%), Afghanistan (29.8%) and Iran (10.6%).

This research has important implications for the treatment of psychopathology in refugees post-settlement. Interventions that target the cognitive process of worry, somatic arousal, and perception of control of fear may be helpful in the early phases of resettlement for refugees separated from family. Future research could also explore the interaction and

outcomes of worry that is productive (e.g. helping family in danger) compared with unproductive (e.g. rehashing experiences of the past).

The psychological effects of separation differ between individuals, however fear for family separated in migration appears to be an experience consistently reported by refugees. In the current study, worry about separated family members was associated with persistently high PTS symptom scores and deteriorations in psychological distress. This provides an additional and potentially modifiable variable for our understanding of the factors predicting persisting psychological symptoms post-settlement.

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Table 1. Demographic characteristics of principal applicants at Wave 1 (N = 1495)[a].

	N (%)
Female	443 (29.6%)
Country of Origin	
Iraq	525 (35.1%)
Afghanistan	446 (29.8%)
Iran	158 (10.6%)
Myanmar	97 (6.5%)
Other	269 (18.0%)
Family Status	
Lives with close family	851 (56.9%)
Separated from family	
Partner/spouse	185 (12.4%)
Child(ren)	255 (17.1%)
Parent	221 (14.9%)
Sibling	418 (28.1%)
Other family member	198 (13.3%)
Education	
6 years or less of school	300 (20.3%)
7-12 years of schooling	638 (43.1%)
Trade, technical or university qualification	283 (19.1%)
Employment	
Employed	133 (9.0%)
Not currently in paid work	1352 (91.0%)
Experienced trauma pre-arrival	1320 (91.9%)
Trauma Type	
Harsh living conditions	510 (35.5%)
War/Conflict	861 (60.0%)
Violence	322 (22.4%)
Imprisonment/Kidnapping	264 (18.4%)
Political/Religious Persecution	831 (57.9%)
Natural Disasters	95 (6.6%)
Other	263 (18.3%)

[a] Some variables had incomplete data, and percentages reflect the available sample.

Table 2. Incremental fit statistics and classification accuracy for latent class growth model for PTSD-8 total scores (N = 1495).

No. of classes	Loglikelihood (LL)	AIC	BIC	Sample size-adjusted BIC	CAIC	Entropy	BLRT *p*-value	VLMRLRT *p*-value	Sample size per class based on most likely class membership
1	-16717.12	33446.24	33478.10	33459.04	33459.28	-	-	-	1495
2	-16083.12	32184.25	32232.04	32203.45	32203.81	0.79	<0.001	<0.001	456/1039
3	-16007.91	32039.83	32103.55	32065.43	32065.91	0.71	<0.001	<0.001	441/167/887
4	-15924.26	31878.52	31958.17	31910.52	31911.13	0.74	<0.001	<0.001	275/172/860/188
5	-15899.49	31834.98	31930.56	31873.38	31874.11	0.73	<0.001	0.22	153/119/290/192/741
6	-15876.33	31794.67	31906.18	31839.46	31840.32	0.76	<0.001	0.68	86/733/326/181/97/72
7	-15815.68	31679.36	31806.80	31730.56	31731.54	0.75	<0.001	0.002	638/117/229/191/113/71/136

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; BLRT = Bootstrap Likelihood Ratio Test; CAIC = Consistent Akaike Information Criterion; K6 = Kessler-6 questionnaire; PTSD-8 = Post Traumatic Stress Disorder Scale - 8 items; VLMRLRT = Vuong-Lo-Mendell Rubin adjusted Likelihood Ratio Test.

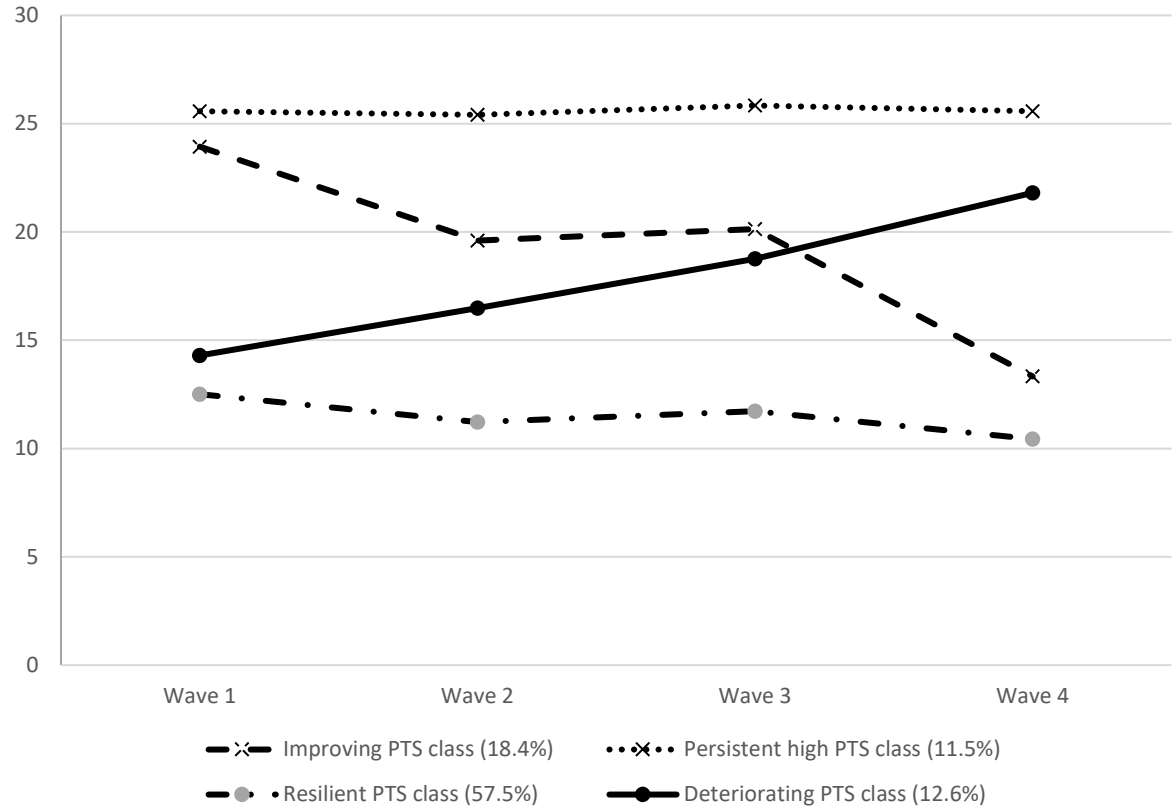

Figure 1. PTSD-8 symptom trajectories across the four waves of assessment (4 years).

Table 3. Incremental fit statistics and classification accuracy for latent class growth model for K6 total scores (N = 1495)..

No. of classes	Loglikelihood (LL)	AIC	BIC	Sample size-adjusted BIC	CAIC	Entropy	BLRT *p*-value	VLMRLRT *p*-value	Sample size per class based on most likely class membership
1	-16135.73	32283.47	32315.33	32296.27	32296.50	-		-	1495
2	-15555.07	31128.15	31175.94	31147.35	31147.71	0.79	<0.001	<0.001	368/1127
3	-15450.49	30924.98	30988.70	30950.58	30951.07	0.76	<0.001	0.001	96/420/979
4	-15357.35	30744.70	30824.35	30776.70	30777.31	0.76	<0.001	<0.001	104/259/914/218
5	-15329.12	30694.24	30789.81	30732.63	30733.37	0.74	<0.001	0.15	216/824/89/299/67
6	-15295.28	30632.57	30744.07	30677.36	30678.22	0.75	<0.001	0.08	237/796/88/91/60/223
7	-15272.49	30592.99	30720.43	30644.18	30645.16	0.76	<0.001	0.18	27/776/111/228/50//81/222

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; BLRT = Bootstrap Likelihood Ratio Test; CAIC = Consistent Akaike Information Criterion; K6 = Kessler-6 questionnaire; PTSD-8 = Post Traumatic Stress Disorder Scale - 8 items; VLMRLRT = Vuong-Lo-Mendell Rubin adjusted Likelihood Ratio Test.

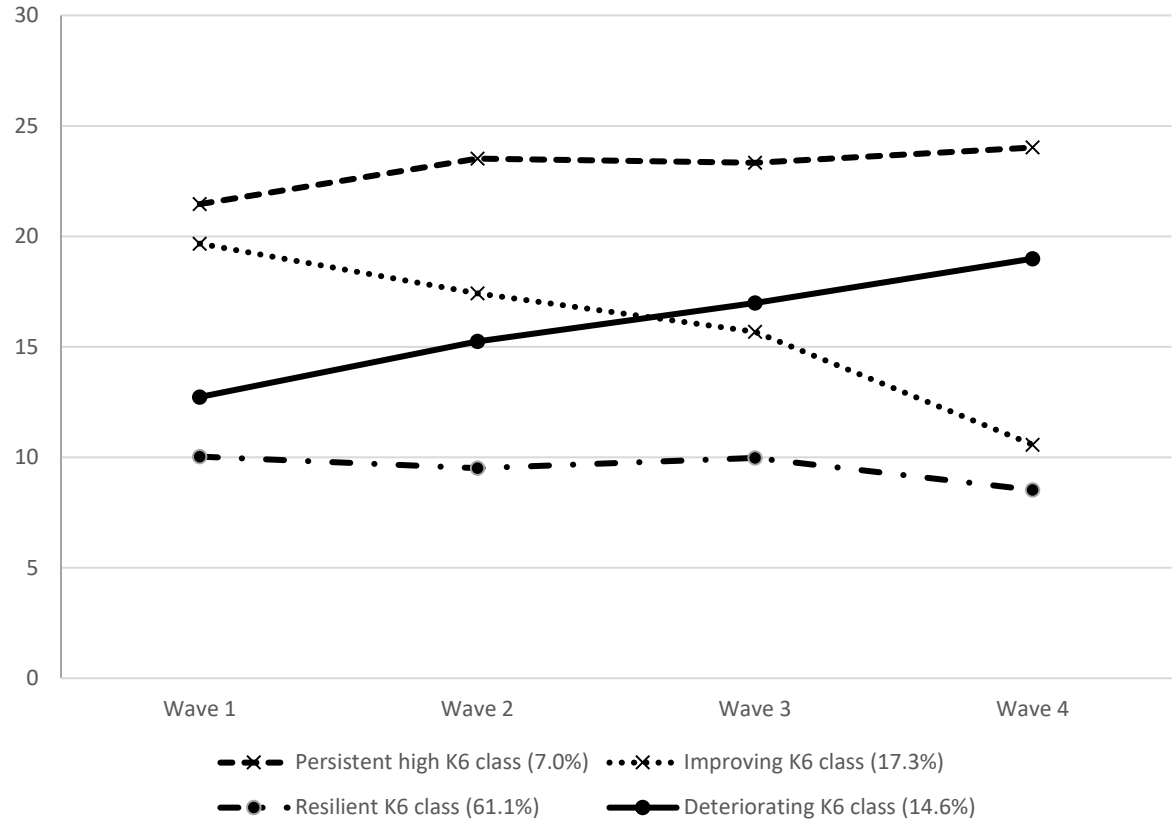

Figure 2. K6 symptom trajectories across the four waves of assessment (4 years).

Table 4. Multinomial regression analyses predicting the PTS trajectory class memberships. Key comparisons are shaded.

	Comparison group					
	Improving PTS trajectory		Persistent High PTS trajectory		Deteriorating PTS trajectory	
Reference group	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]
Persistent High PTS trajectory						
Age	-0.01 (0.01)	0.99 [0.97, 1.00]	-	-	-	-
Female gender	-0.32 (0.20)	0.73 [0.49, 1.09]	-	-	-	-
Lives with close family W1	-0.56 (0.24)*	0.57 [0.36, 0.91]	-	-	-	-
Close family waiting W1	0.14 (0.21)	1.15 [0.76, 1.73]	-	-	-	-
Worry about family W1	-0.09 (0.21)	0.91 [0.60, 1.38]	-	-	-	-
Family arrival since migration	0.17 (0.32)	1.19 [0.63, 2.22]	-	-	-	-
Past trauma	-0.52 (0.69)	0.59 [0.15, 2.28]	-	-	-	-
Deteriorating PTS trajectory						
Age	0.00 (0.01)	1.00 [0.99, 1.02]	0.02 (0.01)	1.02 [1.00, 1.03]	-	-
Female gender	0.10 (0.20)	1.11 [0.74, 1.65]	0.42 (0.22)	1.52 [0.98, 2.36]	-	-
Lives with close family W1	-0.12 (0.22)	0.89 [0.58, 1.35]	0.44 (0.26)	1.55 [0.94, 2.57]	-	-
Close family waiting W1	0.15 (0.20)	1.17 [0.78, 1.74]	0.02 (0.23)	1.02 [0.65, 1.59]	-	-
Worry about family W1	0.19 (0.20)	1.21 [0.81, 1.80]	0.28 (0.23)	1.32 [0.85, 2.07]	-	-
Family arrival since migration	0.00 (0.32)	1.00 [0.53, 1.88]	-0.17 (0.35)	0.84 [0.42, 1.67]	-	-
Past trauma	1.21 (0.44)**	3.34 [1.41, 7.90]	1.73 (0.64)**	5.63 [1.61, 19.61]	-	-
Resilient PTS trajectory						
Age	0.03 (0.01)**	1.03 [1.02, 1.04]	0.04 (0.01)***	1.04 [1.03, 1.06]	0.03 (0.01)***	1.03 [1.01, 1.04]
Female gender	0.47 (0.16)**	1.61 [1.18, 2.19]	0.79 (0.18)***	2.21 [1.54, 3.17]	0.37 (0.18)*	1.45 [1.02, 2.07]
Lives with close family W1	0.48 (0.16)**	1.61 [1.18, 2.20]	1.04 (0.21)***	2.82 [1.86, 4.29]	0.60 (0.19)**	1.82 [1.26, 2.62]
Close family waiting W1	-0.12 (0.15)	0.89 [0.66, 1.20]	-0.25 (0.19)	0.78 [0.54, 1.12]	-0.27 (0.18)	0.76 [0.54, 1.08]
Worry about family W1	0.47 (0.15)**	1.60 [1.18, 2.15]	0.56 (0.19)**	1.75 [1.21, 2.53]	0.28 (0.17)	1.32 [0.94, 1.86]
Family arrival since migration	0.07 (0.24)	1.07 [0.66, 1.73]	-0.10 (0.28)	0.90 [0.52, 1.57]	0.07 (0.28)	1.07 [0.62, 1.84]
Past trauma	1.27 (0.38)**	3.56 [1.68, 7.52]	1.79 (0.60)**	5.99 [1.84, 19.48]	0.06 (0.28)	1.06 [0.61, 1.85]

Note. CI = Confidence Interval, OR = Odds Ratio; W1 = Wave 1.
**p <.05, **p<.01, ***p<.001*

Table 5. Multinomial regression analyses predicting the K6 trajectory class memberships. Key comparisons are shaded.

	Comparison group					
	Improving K6 trajectory		Persistent High K6 trajectory		Deteriorating K6 trajectory	
Reference group	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]	B (SE)	OR [95% CI]
Persistent High K6 trajectory						
Age	0.00 (0.01)	1.00 [0.98, 1.02]	-	-	-	-
Female gender	-0.32 (0.24)	0.73 [0.45, 1.17]	-	-	-	-
Lives with close family W1	-0.63 (0.28)*	0.53 [0.31, 0.92]	-	-	-	-
Close family waiting W1	-0.62 (0.25)*	0.54 [0.31, 0.92]	-	-	-	-
Worry about family W1	0.34 (0.25)	1.41 [0.86, 2.30]	-	-	-	-
Family arrival since migration	-0.54 (0.39)	0.58 [0.27, 1.24]	-	-	-	-
Past trauma	-1.47 (1.05)	0.23 [0.03, 1.81]	-	-	-	-
Deteriorating K6 trajectory						
Age	-0.01 (0.01)	0.99 [0.98, 1.01]	-0.01 (0.01)	0.99 [0.97, 1.01]	-	-
Female gender	0.04 (0.19)	1.04 [0.71, 1.52]	0.36 (0.25)	1.43 [0.88, 2.33]	-	-
Lives with close family W1	-0.42 (0.21)	0.66 [0.44, 0.99]	0.21 (0.29)	1.24 [0.70, 2.19]	-	-
Close family waiting W1	-0.01 (0.20)	0.98 [0.67, 1.45]	0.60 (0.26)*	1.82 [1.10, 3.02]	-	-
Worry about family W1	-0.05 (0.20)	0.95 [0.64, 1.40]	-0.40 (0.26)	0.67 [0.41, 1.11]	-	-
Family arrival since migration	-0.42 (0.30)	0.66 [0.37, 1.17]	0.12 (0.41)	1.13 [0.50, 2.52]	-	-
Past trauma	0.77 (0.40)	2.16 [0.99, 4.71]	2.24 (1.04)*	9.41 [1.23, 71.98]	-	-
Resilient K6 trajectory						
Age	0.03 (001)***	1.03 [1.01, 1.04]	0.03 (0.01)**	1.03 [1.01, 1.04]	0.03 (0.01)***	1.03 [1.02, 1.05]
Female gender	0.68 (0.16)***	1.97 [1.45, 2.68]	1.00 (0.22)***	2.72 [1.76, 4.19]	0.64 (0.17)***	1.90 [1.37, 2.63]
Lives with close family W1	0.22 (0.16)	1.25 [0.91, 1.71]	0.85 (0.26)**	2.34 [1.42, 3.87]	0.64 (0.18)***	1.90 [1.34, 2.69]
Close family waiting W1	-0.23 (0.15)	0.80 [0.59, 1.08]	0.39 (0.23)	1.48 [0.94, 2.32]	-0.21 (0.17)	0.81 [0.59, 1.13]
Worry about family W1	0.40 (0.15)*	1.48 [1.10, 2.01]	0.05 (0.23)	1.05 [0.68, 1.64]	0.45 (0.17)**	1.57 [1.13, 2.17]
Family arrival since migration	-0.45 (0.22)*	0.63 [0.41, 0.98]	0.09 (0.36)	1.09 [0.53, 2.23]	-0.03 (0.26)	0.97 [0.58, 1.62]
Past trauma	0.84 (0.33)*	2.31 [1.20, 4.46]	2.31 (1.02)*	10.11 [1.38, 74.04]	0.07 (0.28)	1.07 [0.62, 1.86]

Note. CI = Confidence Interval, OR = Odds Ratio; W1 = Wave 1.
**p <.05, **p<.01, ***p<.001*

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